



## 1.5A Positive Voltage Regulator

## LM78XX

### Description

The Bay Linear LM78XX is integrated linear positive regulator with three terminals. The LM78XX offer several fixed output voltages making them useful in wide range of applications. When used as a zener diode/resistor combination replacement, the LM78XX usually results in an effective output impedance improvement of two orders of magnitude, lower quiescent current.

The LM78XX is available in the TO-252, TO-220 & TO-263 packages,

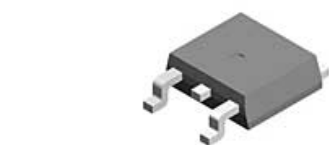
### Features

- **Output Current of 1.5A**
- **Output Voltage Tolerance of 5%**
- **Internal thermal overload protection**
- **Internal Short-Circuit Limited**
- **No External Component**
- **Output Voltage 5.0V, 6V, 8V, 9V, 10V, 12V, 15V, 18V, 24V**
- **Offer in plastic TO-252, TO-220 & TO-263**
- **Direct Replacement for LM78XX**

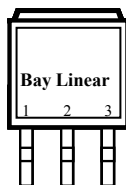
### Applications

- **Post regulator for switching DC/DC converter**
- **Bias supply for analog circuits**

### Packaging Information



TO-263-3 (S)



Top View

1. Input
2. GND
3. Output

### Ordering Information

Device	Operating Voltage	Temp.
LM7805	7 to 20	0 to 125 °C
LM7806	8 to 20	0 to 125 °C
LM7808	10.5 to 23	0 to 125 °C
LM7809	11.5 to 24	0 to 125 °C
LM7810	12.5 to 25	0 to 125 °C
LM7812	14.5 to 27	0 to 125 °C
LM7815	17.5 to 30	0 to 125 °C
LM7818	20.5 to 33	0 to 125 °C
LM7824	26.5 to 39	0 to 125 °C

TO-220 (T)  
TO-263 (S)  
TO-252 (D)

## Absolute Maximum Rating

Parameter	LM78--	Unit
Input Voltage	LM7824, LM7827 All Others	V
Operating Free-Air, Case, Virtual Junction Temp.	0 to 150	°C
Storage Temperature Range	-65 to 150	
Lead temperature 1.6 mm from case for sec.	260	

## Electrical Characteristics (LM7805)

( $V_I=10V$ ,  $I_O=500mA$ ,  $0^\circ C \leq T_J \leq 125^\circ C$ , unless otherwise specified. (Note 1))

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
Output Voltage	$V_O$	$T_J = 25^\circ C$	4.8	5.0	5.2	V
Line Regulation	$\Delta V_O$	$V_I = 7V \text{ to } 25V$ $T_J = 25^\circ C$		3	100	mV
		$V_I = 8V \text{ to } 12V$ $T_J = 25^\circ C$		1	50	
Load Regulation	$\Delta V_O$	$I_O = 5mA \text{ to } 1.5A$ , $25^\circ C$		15	100	mV
		$I_O = 250mA \text{ to } 750mA$ , $25^\circ C$		5	50	
Ripple Rejection	RR	$V_I = 8V \text{ to } 18V$ , $f=120Hz$	62	78		dB
Output Noise Voltage	$V_N$	$F=10Hz \text{ to } 100Hz$ $T_J = 25^\circ C$		40		$\mu V$
Dropout Voltage	$V_D$	$T_J = 25^\circ C$		2.0		V
Quiescent Current		$T_J = 25^\circ C$		4.2	8	mA
Quiescent Current Change	$\Delta I_Q$	$V_I = 7V \text{ to } 25V$ , $T_J = 25^\circ C$			1.3	mA
		$I_O = 5mA \text{ to } 1A$ , $T_J = 25^\circ C$			0.5	

## Electrical Characteristics (LM7806)

( $V_I=11V$ ,  $I_O=500mA$ ,  $0^\circ C \leq T_J \leq 125^\circ C$ , unless otherwise specified. (Note 1))

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
Output Voltage	$V_O$	$T_J = 25^\circ C$	5.75	6.0	6.25	V
Line Regulation	$\Delta V_O$	$V_I = 8V \text{ to } 25V$ $T_J = 25^\circ C$		5	120	mV
		$V_I = 9V \text{ to } 25V$ $T_J = 25^\circ C$		1.5	60	
Load Regulation	$\Delta V_O$	$I_O = 5mA \text{ to } 1.5A$ , $25^\circ C$		14	120	mV
		$I_O = 250mA \text{ to } 750mA$ , $25^\circ C$		4	60	
Ripple Rejection	RR	$V_I = 9V \text{ to } 19V$ , $f=120Hz$	59	75		dB
Output Noise Voltage	$V_N$	$F=10Hz \text{ to } 100Hz$ $T_J = 25^\circ C$		45		$\mu V$
Dropout Voltage	$V_D$	$T_J = 25^\circ C$		2.0		V
Quiescent Current		$T_J = 25^\circ C$		4.3	8.0	mA
Quiescent Current Change	$\Delta I_Q$	$V_I = 8V \text{ to } 25V$ , $T_J = 25^\circ C$			1.3	mA
		$I_O = 5mA \text{ to } 1A$ , $T_J = 25^\circ C$			0.5	

## Electrical Characteristics (LM7808)

( $V_I=14V$ ,  $I_O=500mA$ ,  $0^{\circ}C \leq T_J \leq 125^{\circ}C$ , unless otherwise specified. (Note 1))

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
Output Voltage	$V_O$	$T_J = 25^{\circ}C$	7.7	8.0	8.3	V
Line Regulation	$\Delta V_O$	$V_I = 10.5V \text{ to } 25V$ $T_J = 25^{\circ}C$		6	160	mV
		$V_I = 11V \text{ to } 17V$ $T_J = 25^{\circ}C$		2	80	
Load Regulation	$\Delta V_O$	$I_O = 5mA \text{ to } 1.5A$ , $25^{\circ}C$		12	160	mV
		$I_O = 250mA \text{ to } 750mA$ , $25^{\circ}C$		4	80	
Ripple Rejection	RR	$V_I = 11.5V \text{ to } 21.5V$ , $f=120Hz$	55	72		dB
Output Noise Voltage	$V_N$	$F=10Hz \text{ to } 100Hz$ $T_J = 25^{\circ}C$		52		$\mu V$
Dropout Voltage	$V_D$	$T_J = 25^{\circ}C$		2.0		V
Quiescent Current		$T_J = 25^{\circ}C$		4.3	8	mA
Quiescent Current Change	$\Delta I_Q$	$V_I = 10.5V \text{ to } 25V$ , $T_J = 25^{\circ}C$			1	mA
		$I_O = 5mA \text{ to } 1A$ , $T_J = 25^{\circ}C$			0.5	

## Electrical Characteristics (LM7809)

( $V_I=16V$ ,  $I_O=500mA$ ,  $0^{\circ}C \leq T_J \leq 125^{\circ}C$ , unless otherwise specified. (Note 1))

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
Output Voltage	$V_O$	$T_J = 25^{\circ}C$	8.6	9.0	9.40	V
Line Regulation	$\Delta V_O$	$V_I = 11.5V \text{ to } 27V$ $T_J = 25^{\circ}C$		7	180	mV
		$V_I = 13V \text{ to } 19V$ $T_J = 25^{\circ}C$		2	90	
Load Regulation	$\Delta V_O$	$I_O = 5mA \text{ to } 1.5A$ , $25^{\circ}C$		12	180	mV
		$I_O = 250mA \text{ to } 750mA$ , $25^{\circ}C$		4	90	
Ripple Rejection	RR	$V_I = 12V \text{ to } 19V$ , $f=120Hz$	55	70		dB
Output Noise Voltage	$V_N$	$F=10Hz \text{ to } 100Hz$ $T_J = 25^{\circ}C$		60		$\mu V$
Dropout Voltage	$V_D$	$T_J = 25^{\circ}C$		2.0		V
Quiescent Current		$T_J = 25^{\circ}C$		4.3	8	mA
Quiescent Current Change	$\Delta I_Q$	$V_I = 11.5V \text{ to } 27V$ , $T_J = 25^{\circ}C$			1.0	mA
		$I_O = 5mA \text{ to } 1A$ , $T_J = 25^{\circ}C$			0.5	

**Electrical Characteristics (LM7810)**(V<sub>I</sub>=17V, I<sub>O</sub>=500mA, 0°C ≤ T<sub>J</sub> ≤ 125 °C, , unless otherwise specified. (Note 1)

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
Output Voltage	V <sub>O</sub>	T <sub>J</sub> = 25 °C	9.6	10	10.4	V
Line Regulation	ΔV <sub>O</sub>	V <sub>I</sub> = 12.5V to 28V T <sub>J</sub> = 25 °C		7	200	mV
		V <sub>I</sub> = 14V to 20V T <sub>J</sub> = 25 °C		2	100	
Load Regulation	ΔV <sub>O</sub>	I <sub>O</sub> = 5mA to 1.5A, 25 °C		12	200	mV
		I <sub>O</sub> = 250mA to 750mA, 25 °C		4	100	
Ripple Rejection	RR	V <sub>I</sub> = 13V to 23V, f=120Hz	55	71		dB
Output Noise Voltage	V <sub>N</sub>	F= 10Hz to 100Hz T <sub>J</sub> = 25 °C		70		μV
Dropout Voltage	V <sub>D</sub>	T <sub>J</sub> = 25 °C		2.0		V
Quiescent Current		T <sub>J</sub> = 25 °C		4.3	8	mA
Quiescent Current Change	ΔI <sub>Q</sub>	V <sub>I</sub> = 12.5V to 28V, T <sub>J</sub> = 25 °C			1.0	mA
		I <sub>O</sub> = 5mA to 1A, T <sub>J</sub> = 25 °C			0.5	

**Electrical Characteristics (LM7812)**(V<sub>I</sub>=19V, I<sub>O</sub>=500mA, 0°C ≤ T<sub>J</sub> ≤ 125 °C, unless otherwise specified. (Note 1)

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
Output Voltage	V <sub>O</sub>	T <sub>J</sub> = 25 °C	11.50	12	12.5	V
Line Regulation	ΔV <sub>O</sub>	V <sub>I</sub> = 14.5V to 30V T <sub>J</sub> = 25 °C		10	240	mV
		V <sub>I</sub> = 16V to 22V T <sub>J</sub> = 25 °C		3.0	120	
Load Regulation	ΔV <sub>O</sub>	I <sub>O</sub> = 5mA to 1.5A, 25 °C		12	240	mV
		I <sub>O</sub> = 250mA to 750mA, 25 °C		4	120	
Ripple Rejection	RR	V <sub>I</sub> = 15V to 25V, f=120Hz	55	71		dB
Output Noise Voltage	V <sub>N</sub>	F= 10Hz to 100Hz T <sub>J</sub> = 25 °C		75		μV
Dropout Voltage	V <sub>D</sub>	T <sub>J</sub> = 25 °C		2.0		V
Quiescent Current		T <sub>J</sub> = 25 °C		4.3	8.0	mA
Quiescent Current Change	ΔI <sub>Q</sub>	V <sub>I</sub> = 14.5V to 30V, T <sub>J</sub> = 25 °C			1.0	mA
		I <sub>O</sub> = 5mA to 1A, T <sub>J</sub> = 25 °C			0.5	

**Electrical Characteristics (LM7815)**(V<sub>I</sub>=23V, I<sub>O</sub>=500mA, 0°C ≤ T<sub>J</sub> ≤ 125 °C, unless otherwise specified. (Note 1)

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
Output Voltage	V <sub>O</sub>	T <sub>J</sub> = 25 °C	14.40	15	15.60	V
Line Regulation	ΔV <sub>O</sub>	V <sub>I</sub> = 17.5V to 30V T <sub>J</sub> = 25 °C		12	300	mV
		V <sub>I</sub> = 20V to 26V T <sub>J</sub> = 25 °C		3	150	
Load Regulation	ΔV <sub>O</sub>	I <sub>O</sub> = 5mA to 1.5A, 25 °C		12	300	mV
		I <sub>O</sub> = 250mA to 750mA, 25 °C		4	150	
Ripple Rejection	RR	V <sub>I</sub> = 18.5V to 28.5V, f=120Hz	54	70		dB
Output Noise Voltage	V <sub>N</sub>	F= 10Hz to 100Hz T <sub>J</sub> = 25 °C		90		μV
Dropout Voltage	V <sub>D</sub>	T <sub>J</sub> = 25 °C		2.0		V
Quiescent Current		T <sub>J</sub> = 25 °C		4.3	8.0	mA
Quiescent Current Change	ΔI <sub>Q</sub>	V <sub>I</sub> = 17.5V to 30V, T <sub>J</sub> = 25 °C			1.0	mA
		I <sub>O</sub> = 5mA to 1A, T <sub>J</sub> = 25 °C			0.5	

**Electrical Characteristics (LM7818)**(V<sub>I</sub>=27V, I<sub>O</sub>=500mA, 0°C ≤ T<sub>J</sub> ≤ 125 °C, unless otherwise specified. (Note 1)

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
Output Voltage	V <sub>O</sub>	T <sub>J</sub> = 25 °C	17.30	18	18.7	V
Line Regulation	ΔV <sub>O</sub>	V <sub>I</sub> = 21V to 33V T <sub>J</sub> = 25 °C		15	360	mV
		V <sub>I</sub> = 24V to 33V T <sub>J</sub> = 25 °C		5	180	
Load Regulation	ΔV <sub>O</sub>	I <sub>O</sub> = 5mA to 1.5A, 25 °C		12	360	mV
		I <sub>O</sub> = 250mA to 750mA, 25 °C		4	180	
Ripple Rejection	RR	V <sub>I</sub> = 22V to 32V, f=120Hz	53	69		dB
Output Noise Voltage	V <sub>N</sub>	F= 10Hz to 100Hz T <sub>J</sub> = 25 °C		110		μV
Dropout Voltage	V <sub>D</sub>	T <sub>J</sub> = 25 °C		2.0		V
Quiescent Current		T <sub>J</sub> = 25 °C		4.5	8.0	mA
Quiescent Current Change	ΔI <sub>Q</sub>	V <sub>I</sub> = 21V to 33V, T <sub>J</sub> = 25 °C			1.0	mA
		I <sub>O</sub> = 5mA to 1A, T <sub>J</sub> = 25 °C			0.5	

**Electrical Characteristics (LM7824)**(V<sub>I</sub>=33V, I<sub>O</sub>=500mA, 0°C ≤ T<sub>J</sub> ≤ 125 °C, unless otherwise specified. (Note 1)

Parameter	Symbol	Conditions	MIN	TYP	MAX	UNIT
Output Voltage	V <sub>O</sub>	T <sub>J</sub> = 25 °C	23	24	25	V
Line Regulation	ΔV <sub>O</sub>	V <sub>I</sub> = 27V to 38V T <sub>J</sub> = 25 °C		18	480	mV
		V <sub>I</sub> = 30V to 36V T <sub>J</sub> = 25 °C		6	240	
Load Regulation	ΔV <sub>O</sub>	I <sub>O</sub> = 5mA to 1.5A, 25 °C		12	480	mV
		I <sub>O</sub> = 250mA to 750mA, 25 °C		4	240	
Ripple Rejection	RR	V <sub>I</sub> = 28V to 38V, f=120Hz	50	66		dB
Output Noise Voltage	V <sub>N</sub>	F= 10Hz to 100Hz T <sub>J</sub> = 25 °C		170		μV
Dropout Voltage	V <sub>D</sub>	T <sub>J</sub> = 25 °C		2.0		V
Quiescent Current		T <sub>J</sub> = 25 °C		4.6	8.0	mA
Quiescent Current Change	ΔI <sub>Q</sub>	V <sub>I</sub> = 27V to 38V, T <sub>J</sub> = 25 °C			1.0	mA
		I <sub>O</sub> = 5mA to 1.0A, T <sub>J</sub> = 25 °C			0.5	

**Advance Information-** These data sheets contain descriptions of products that are in development. The specifications are based on the engineering calculations, computer simulations and/ or initial prototype evaluation.

**Preliminary Information-** These data sheets contain minimum and maximum specifications that are based on the initial device characterizations. These limits are subject to change upon the completion of the full characterization over the specified temperature and supply voltage ranges.

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